

THE IDENTITY AND TAXONOMIC STATUS OF
MEGAPODIUS STAIRI AND *M. BURNABYI*
(AVES: MEGAPODIIDAE)

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Abstract. — *Megapodius stairi* and *M. burnabyi* were described by Gray (1861) on the basis of single eggs collected, respectively, in areas of Samoa and Tonga where no megapodes have been recorded since. For more than a century, both names have been regarded as synonyms of *M. pritchardi* Gray (1864), an extant species known from whole specimens as well as eggs. An examination of both holotypical eggs reveals that neither *M. stairi* or *M. burnabyi* is unequivocally synonymous with *M. pritchardi*, with *M. stairi* particularly unlikely to represent *M. pritchardi*. On the basis of size and color, I cannot rule out that these specimens represent *M. freycinet* or perhaps even an extinct species of *Megapodius*. *Megapodius stairi* and *M. burnabyi* are best regarded as *nomina dubia*, mainly because their holotypical specimens lack species-specific characters.

The To'aga archaeological site on Ofu Island, American Samoa, recently yielded a fragmentary ulna and femur of an indeterminate species of megapode (*Megapodius* sp.), providing the easternmost record for the entire family Megapodiidae (Steadman 1991). The bones from To'aga are larger than those of *M. pritchardi* (confined to Niuafo'ou, Tonga), the only species of megapode that survives east of Vanuatu (=New Hebrides) and *M. laperouse* of Palau and the Mariana Islands. They are much smaller, however, than the bones of two extinct species recently described from late Holocene archaeological and paleontological sites: *M. alimentum* from the Tongan islands of Lifuka and 'Eua; and *M. molistructor* of New Caledonia and Lifuka (Balouet & Olson 1989; Steadman 1989a, 1989b, pers. obs.). The archaeological bones of *M. freycinet* from Tikopia, Solomon Islands (Steadman et al. 1990), and those from the To'aga site are at the smallest end of the size range of *M. freycinet*, a widespread and geographically variable species (sensu Mayr 1938, who unites within *freycinet* several species recognized by Peters 1934) that

reaches its modern eastern limit in Vanuatu, about 2100 km west of Ofu. Except for the Tikopia record, *M. freycinet* has not been recorded prehistorically from islands outside of its modern range. Probable records from the 19th and early 20th centuries, however, suggest a much greater past than present distribution for *M. freycinet* (see Discussion).

The To'aga specimens of *Megapodius* represent the first well documented record of a megapode from Samoa. There is, however, historical evidence that a megapode may have existed in the mid-1800s in Western Samoa, as well as in central Tonga. This paper reviews that evidence as part of an effort to determine the natural distribution of megapodes in Oceania.

Review of the Evidence

Gray (1859:46) listed the following record from the collections of the British Museum: "Megapodius _____? The egg only of a *Megapodius* has been brought from the Samoan or Navigator' Islands; but no example of the perfect bird has yet been recorded by

naturalists or others as from that locality.” Two years later, Gray (1861:290) named the Samoan megapode as *Megapodius stairi*, describing its egg as “dusky white. Length 3" 1" ', width 1" 1" '. Samoan or Navigator's Islands (Rev. J. B. Stair 1847).” [” = inch; "' = a line = 1/12 inch.] *Megapodius stairi* was listed without further comment by Gray (1864). Gray (1861:290) described a second new species, *Megapodius burnabyi*, also known from a single egg, this one collected sometime before 1861 by Lt. Burnaby, R.N., at an undetermined island in the Ha'apai Group of Tonga. (In the 19th century, Ha'apai was variously known as Hapai, Hapace, Harpace, or Hapache.) The holotypical eggs of *M. stairi* and *M. burnabyi* are in the British Museum (Natural History), the former catalogued as BM(NH) 1847.10.11.5 and the latter, which was not entered in the registry until three years ago, as 1988.4.3.

The habits of a megapode on the Tongan island of Niuafou'ou were described in some detail by Bennett (1862), who collected a single egg (BM(NH) 1863.5.16.3). Bennett believed that the megapode from Niuafou'ou would be found to be conspecific with *M. freycinet* of Vanuatu. The megapodes on Niuafou'ou were named *Megapodius pritchardi* by Gray (1864), with a skin designated as the holotype. Finsch & Hartlaub (1867: xxxvi, xxxvii, 153–155) recognized *M. pritchardi* and questioned the validity of *M. stairi* and *M. burnabyi*. Hutton (1869:353) noted, “We have also in the [Auckland] Museum what is probably a new species of Megapode, from Niupo [=Niuafou'ou], one of the islands in the Friendly group [=Tonga].” Buller (1870:15) noted that *M. stairi* “is not yet placed on the list of well-determined species,” and proposed the name *Megapodius huttoni* based on the specimen (a skin) mentioned by Hutton (see also Salvin 1872:418). Beginning with Finsch (1877), *M. huttoni* has been regarded as a synonym of *M. pritchardi*.

Finsch (1872:33) listed *Megapodius stairi*

as being from Samoa and stated that (p. 52; translated from German), “The *Megapodius* of the Samoan Islands unfortunately remains unknown.” Whitmee (1875:447), who regarded *M. stairi* as a synonym of *M. pritchardi*, stated that “The type of *M. stairii* was, I believe, sent from Samoa, but was brought here from the island of Nina-fou, where *M. pritchardi* exists. If I am correct in this, then the former name has the right of precedence.” Of *M. stairi*, Layard (1876: 496) stated, “Mr. Whitmee and Mr. Krause both assured me no Megapode exists in the Navigators' Islands [=Samoa]. Mr. Whitmee affirmed that the bird on which the species was founded was brought from Ninafoou by the Rev. W. Stair, and transmitted to England among some Samoan skins; hence the mistake.” Of *M. burnabyi*, Layard (1876:503) noted, “No megapode is found in the group [Tonga], according to the testimony of the whites, who, however, know the Ninafoou bird well.” Thus ornithologists began to doubt the validity of *Megapodius stairi* and *M. burnabyi*, at least in part because no further evidence of megapodes had come forth from Samoa or Ha'apai.

Finsch (1877), who listed *Megapodius pritchardi* Gray 1864, and *M. burnabyi* Gray 1861 as synonyms of *M. stairi*, stated (p. 784), “Since Mr. Layard assures us that *M. stairi*, Gray, was based on specimens from Ninafu (and not from Samoa, where no Megapode exists) the older name must be applied to this species.” Layard's assurance was based upon the belief of Whitmee and Krause that the holotypical egg of *M. stairi* came from Niuafou'ou rather than Samoa. The basis of this belief is uncertain, although it may be due to the fact that entire specimens of megapodes had been found only on Niuafou'ou. It is possible, however, that when the single eggs were sent by Rev. Stair in 1847 and by Lt. Burnaby before 1861, megapodes existed in Samoa and Ha'apai, where they are now extinct.

The original, hand-written data slip with the holotype of *Megapodius burnabyi* notes

that this egg was "called the 'chief's egg' as they are only allowed to eat them." Bennett (1862:247) noted that the nesting grounds of *M. pritchardi* on Niuafou were "under the protection of the king or chief, and by his permission only can the birds or eggs be procured." Because the consumption of megapodes and their eggs was limited, it is reasonable to speculate that these birds were rare and probably prestigious items for trade. Megapodes and their eggs may have been exchanged as items in the extensive trading network that operated among Fiji, Tonga, and Samoa in late prehistoric and early historic times (Stair 1895; Kirch 1984:238–242, 1988:257–260). Even if megapodes of the Fiji/Tonga/Samoa region were confined by that time to Niuafou, they would have been known to Tongans in Ha'apai, as well as to Samoans. Evidence that the holotypes of *M. stairi* and *M. burnabyi* might have been transported to Samoa and Ha'apai from Niuafou would require that the specimens be sufficiently similar to eggs of *M. pritchardi* to consider the three names synonymous, a matter to be addressed shortly.

Wiglesworth (1891:58) united the three named species as *Megapodius stairi*, giving Niuafou as the only locality. Oates (1901) followed Finsch (1877) and Wiglesworth (1891) in synonymizing the three species, but merged them under the later name *Megapodius pritchardi*, stating (p. 17) that "The eggs of Pritchard's Megapode are subject to much variation, being reddish-brown, pinkish, stone-coloured, brown or whitish. They measure from 2.95 to 3.15 in length, and from 1.6 to 1.9 in breadth." Lister (1911) reviewed the distribution of *Megapodius* without mentioning *M. stairi* or *M. burnabyi*, and concluded (p. 758) that, "there is no satisfactory evidence that a Megapode has ever existed on any Pacific island east of a line bordering the Philippines, Solomon Islands, and New Hebrides except the Pelews, Marianne Islands, and Niuafou." His statement marked the disappearance of *M. stairi* and *M. burnabyi* from the ornitholog-

ical literature until their brief mention by Walters (1980:33), Balouet & Olson (1989: 11), and Steadman (1989b). Neither name was noted in the reviews of Pacific megapodes by Peters (1934), Mayr (1938, 1945), or Amadon (1942).

The length and width of the holotypical egg of *Megapodius stairi* was given incorrectly by Gray (1861:290) as 3" 1" and 1" 1" (78 × 28 mm when converted from inches and lines to metric). For his species *M. pritchardi*, which included *M. stairi* and *M. burnabyi*, Oates (1901) gave measurements of 75–80 × 41–48 mm. Six eggs of *M. pritchardi* found on Niuafou in 1984 measured 73.2–76.4 × 41.1–44.5 mm (Rinke 1986).

My measurements of *Megapodius* eggs are presented in Table 1. The holotypes of *M. stairi* and *M. burnabyi* are 78.8 × 47.6 mm and 77.3 × 43.9 mm, respectively. For *M. stairi*, the length is greater than in 69 of 70 eggs of *M. pritchardi*, while the width is greater than in 71 of 72 eggs of that species. Compared to *M. freycinet layardi* of Vanuatu (the extant population of megapodes nearest to *M. pritchardi*), both the length and width of *M. stairi* are well within the range of variation. For *M. burnabyi*, the length is greater than in 64 of 70 eggs of *M. pritchardi* and less than in 41 of 47 eggs of *M. freycinet layardi*, while the width is near the mean of *M. pritchardi* and less than 46 of 47 eggs of *M. f. layardi*. Thus in measurements *M. stairi* from Samoa more closely resembles *M. freycinet (M. f. layardi* or perhaps *M. f. eremita)* than *M. pritchardi*, while *M. burnabyi* from Ha'apai resembles *M. pritchardi* slightly more than *M. freycinet*. Because *M. pritchardi* was once more widespread (I have just discovered its bones on 'Eua, Tonga), the surviving population on Niuafou may not represent the full range of egg size in this species.

Unfortunately, color is not a reliable species-level character in eggs of *Megapodius* because of the great amount of variation in specimens. Weir (1973:81) described the

eggs of *M. pritchardi* as "light brown in color occasionally having scattered white flecks. The eggs tend to lighten with age but this is not a reliable indicator of age since there is a great variation in color at the time of laying." Rinke (1986:83) reported fresh eggs of *M. pritchardi* as "yellowish ochre." Coates (1985:140) noted that the originally buff colored egg of *M. freycinet* "is said to turn coffee brown after a few days in the mound." The holotype of *M. stairi* is a creamy buff with slight mottling, while that of *M. burnabyi* is a darker, slightly mottled olive tan. I have seen both of these colors in eggs of *M. pritchardi* as well as *M. freycinet*. To summarize, I found no consistent differences between the eggs of *M. pritchardi* and *M. freycinet* in color, surface texture, proportions, or overall shape.

The exact islands on which the holotypes of *Megapodius stairi* and *M. burnabyi* were collected have not been determined. As stated by Gray (1861), the holotype and only specimen of *M. stairi* was collected in "Samoa" in 1847 by Reverend John B. Stair (1815–1898), a missionary and natural historian who lived in what now is called Western Samoa (Wynne 1969:200). His botanical collections indicate that Stair was on the island of Upolu in 1843 (Anon. 1925:727; Bridson et al. 1980:233), whereas his own writings (Stair 1895) suggest that he lived on Upolu as well as the neighboring island of Savai'i in the 1840's. Thus it seems likely that the holotype of *M. stairi* was collected either on Upolu or Savai'i, rather than on the smaller, eastern Samoan islands of Tutuila and the Manu'a Group. As far as I can determine from the British Museum collections, the holotype of *Megapodius stairi* is the only egg known to have been collected by Stair. Each of the British Museum skins collected by Stair lists merely "Samoa" rather than a specific island as the collection locality.

Lt. (later Captain) M. B. Burnaby, R.N. (1825–1896; Anonymous 1897:694; Pine 1952:310) collected the holotype of *Mega-*

podius burnabyi in the Ha'apai Group of Tonga before 1861. I am aware of no other natural history specimens collected by Burnaby. Because the island of Lifuka was (and still is) the center of population and commerce within the Ha'apai Group, it is likely that Burnaby's ship was anchored at Lifuka when he obtained the megapode egg destined to bear his name.

Summary and Discussion

The 19th century oological holotypes of *Megapodius stairi* and *M. burnabyi* still exist and indeed represent megapodes. *Megapodius stairi* was collected in Samoa, probably on Upolu or Savai'i, while *M. burnabyi* was collected in the Ha'apai Group of Tonga, probably on Lifuka. No specimens or other records of megapodes have been collected subsequently in Samoa or Ha'apai. On the basis of size, the holotype of *M. stairi* may be conspecific with *M. freycinet*, a widespread species that reaches its eastern limit today in Vanuatu. The single egg of *M. stairi* is larger than 99% of modern specimens of *M. pritchardi*, which is known from wild populations only on Niuafo'ou (Tonga), an island between Upolu and Ha'apai. The holotype of *M. burnabyi* is of a size that might pertain to either *M. freycinet* or *M. pritchardi*. Either or both of the holotype eggs of *M. stairi* and *M. burnabyi* may have been inter-island trade items of 19th century Samoans and Tongans. If *M. stairi* represents a megapode more closely related to, or conspecific with, *M. freycinet*, then *M. stairi* may represent the same species as the archaeological bones of an indeterminate megapode from Ofu, which also are at the lower limit of the size range of *M. freycinet* but larger than *M. pritchardi*.

Considering the vulnerability of megapodes on many oceanic islands (Olson 1980; Balouet & Olson 1989; Steadman 1989a, 1989b) and the great amount of inter-island trade in late prehistory in the Tonga-Samoa-Fiji region, the holotypical eggs of

Table 1.—Measurements (in mm) of the eggs of *Megapodius*, with mean, range, and sample size; mainly from specimens in the British Museum (Natural History), supplemented by those in the American Museum of Natural History, New York State Museum, and National Museum of Natural History, Smithsonian Institution.

	Locality	Length	Width
<i>M. stairi</i> , holotype BM(NH) 1847.10.11.5	Samoa: probably Upolu or Savai'i	78.8 1	47.6 1
<i>M. burnabyi</i> , holotype BM(NH) 1988.4.3	Tonga: Ha'apai: probably Lifuka	77.3 1	43.9 1
<i>M. pritchardi</i>	Tonga: Niuafu'ou	74.8 71.4–79.7	44.4 40.4–49.0
<i>M. freycinet layardi</i>	Vanuatu: Tanna, Santo, Tongoa, Malakula, Efate, Banks	70 81.8 71.5–89.7	72 47.4 42.6–50.8
<i>M. freycinet eremita</i>	Solomon Is.: Choiseul, San Cristo- bal, Isabel, Treasury, Guadal- canal, Savo, Gulf, Arnavon	47 78.0 73.5–84.4	47 47.8 43.9–51.4
<i>M. freycinet eremita</i>	Bismark Arch.: Feni, Nissan, New Britain, Lihir	47 76.9 71.3–79.8	50 47.5 44.4–50.0
<i>M. freycinet affinis</i>	Papua New Guinea	17 80.4 78.8–82.5	17 49.9 46.5–52.1
<i>M. freycinet duperryii</i>	Papua New Guinea	3 85.5 80.1–90.8	3 52.6 49.2–54.9
<i>M. freycinet macgillivrayi</i>	Papua New Guinea: Rossell, Fer- gusson Islands	10 81.2 79.7–83.5	10 53.0 51.9–55.0
<i>M. freycinet macgillivrayi</i>	Papua New Guinea: Trobriand Is.	7 88.2 83.7–93.2	7 54.2 51.2–55.7
<i>M. freycinet yorki</i>	Australia: Queensland	6 88.7 84.4–96.0	6 53.6 50.8–55.6
<i>M. freycinet tumulus</i>	Australia: Northern Territory	11 88.7 86.1–93.4	11 54.8 52.8–57.4
<i>M. freycinet buruensis</i>	Moluccas: Buru	9 79.4 75.5–83.4	9 48.9 44.7–50.8
<i>M. freycinet reinwardt</i>	Indonesia: Tiga, Megalun	6 74.4 72.1–75.7	7 46.5 45.5–47.9
<i>M. freycinet reinwardt</i>	Indonesia: Komodo, Kalao	3 84.3 83.0–86.4	3 51.2 50.4–52.0
<i>M. freycinet gilberti</i>	Indonesia: Sulawesi	3 79.7 1	3 50.5 1
<i>M. freycinet tabon</i>	Philippines: Mindanao	1 80.2 73.6–89.5	1 48.9 43.9–54.1
<i>M. freycinet pusillus</i>	Philippines: Luzon	44 81.6 1	44 48.5 1

Table 1.—Continued.

	Locality	Length	Width
<i>M. freycinet pusillus</i> or <i>M. f. tabon</i>	Philippines: island unknown	80.3	48.8
		75.9–85.0	46.6–50.8
<i>M. freycinet cumingi</i>	Borneo, Palawan	7	7
		76.5	47.1
		71.9–80.1	45.9–48.4
<i>M. freycinet nicobariensis</i>	Nicobar Is.: northern island(s)	8	8
		82.1	52.4
		76.4–88.7	49.0–55.5
<i>M. freycinet abbotti</i>	Nicobar Is.: Great Nicobar	77	77
		83.4	50.3
		81.2–85.3	49.7–51.6
<i>M. freycinet abbotti</i> or <i>M. f. nicobariensis</i>	Nicobar Is.: island unknown	4	4
		81.4	52.5
		78.5–84.4	49.1–54.6
<i>M. cf. freycinet</i> subsp.?	Andaman Is.	9	9
		80.3	50.3
		77.3–84.1	48.3–52.0
<i>M. laperouse senex</i>	Palau: island unknown	4	5
		77.7	46.4
		72.4–83.4	44.5–47.8
		7	7

Megapodius stairi and *M. burnabyi* might represent valued trade items that originated on some other island that still supported megapodes in the 19th century. If the largest eggs tended to be chosen for chiefly consumption or trade, then even *M. stairi* is likely to be synonymous with *M. pritchardi*, known historically only from Niuafo'ou but recorded as a fossil from 'Eua (pers. obs.). That *M. stairi* and *M. burnabyi* may be synonymous with *M. pritchardi* is reasonable geographically, as Niuafo'ou is directly between Ha'apai and Western Samoa and must have been visited regularly by trading boats from Tonga and Samoa.

If conspecific, the names *Megapodius stairi* Gray 1861 and *M. burnabyi* Gray 1861 would both have priority over *M. pritchardi* Gray 1864. Gray (1861) named both *M. stairi* and *M. burnabyi* on p. 290, with the former several lines above the latter. As neither of these named species is unequivocally synonymous with *M. freycinet* or *M. pritchardi*, I recommend that they be considered

nomina dubia and the name *M. pritchardi* therefore should be retained for the species on Niuafo'ou. Unless additional evidence is forthcoming, neither *M. stairi* or *M. burnabyi* should be regarded as certain records of indigenous populations of megapodes in 19th century Samoa or Ha'apai. The survival of *M. pritchardi* on Niuafo'ou has been due to chiefly control of the exploitation of eggs and birds from the conspicuous nest mounds. The people of Niuafo'ou realized that conserving the megapodes, which probably occurred nowhere else in the region, would help to sustain their share of commerce in the Samoa-Tonga-Fiji trade network.

If *Megapodius stairi* and *M. burnabyi* represent populations indigenous to the islands where their holotype eggs were collected, they are not the sole examples of megapodes that survived into the 19th or early 20th century only to disappear before an adult skin could be collected. Eggs, downy chicks, or written evidence suggest the former pres-

ence of megapodes, certainly or probably in the size range of *M. freycinet*, on the following islands: New Caledonia (*M. "andersoni"*; see Balouet & Olson 1989:11); the Kermadec Islands (Lister 1911); Lord Howe Island (two downy chicks in British Museum, examined by DWS in 1990; Lister 1911: 758, claims that these specimens are really from "New Hope" Island, another name for Niuafo'ou; I regard the matter as unresolved); and the Andaman Islands (five eggs in British Museum, examined in 1990 by DWS; see Table 1). In each case, bones (yet to be discovered) may be our only hope to learn more about these and other lost populations of megapodes.

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